

July 18, 2003

Christine Kump-Mitchell, P.E.
Hazardous Waste Program
Missouri Department of Natural Resources
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St. Louis, MO 63125

Subject: Meeting Agenda and Results
Corrective Action Work Plan - Addendum 3
Indoor Air Quality Assessment
Modine Manufacturing Company
Camdenton, Missouri

Dear Ms. Kump-Mitchell:

CH2M HILL is submitting this package of material on behalf of Modine Manufacturing Company (Modine). The package contains an agenda for our upcoming meeting later this month and an analytical summary table presenting the results of the indoor air sampling conducted in late March of this year.

As the summary table illustrates, the indoor air concentrations at the Camdenton facility are well below any established occupational exposure limit. Modine considered: (1) Permissible exposure limits (PELs) established by the Occupational Safety and Health Administration (OSHA), (2) Threshold Limit Values (TLVs) established by the American Conference of Governmental Industrial Hygienists (ACGIH), and (3) Recommended exposure limits (RELs) established by the National Institute for Occupational Safety and Health (NIOSH). Modine selected the smallest value published by these organizations for comparison to the indoor air concentrations measured at the facility in Camdenton. Based on the comparison, the Resource Conservation and Recovery Act (RCRA) Environmental Indicator (EI) for Human Exposure Under Control has been met at the Camdenton Facility.



R00416574

RCRA RECORDS CENTER

Agenda
Indoor Air Sampling Results
Modine Manufacturing
Camdenton Missouri Facility
Taum Sauk Conference Room
MDNR Office - Jefferson City, MO

Date: July 24, 2002

Time: 10:00 AM CDT

Participants: Modine Manufacturing, Hamilton Sundstrand, CH2M HILL,
SECOR, MACTEC, MDNR, US EPA Region VII

- 1) Introductions
- 2) Purpose
 - Obtain concurrence that the Resource Conservation and Recovery Act (RCRA) Environmental Indicator (EI) for Human Exposure Under Control has been met at the Camdenton Facility.
- 3) Presentation
 - Background
 - EI Considerations in Workplaces
 - Air Sampling Results
 - Conclusions
- 4) Discussion
- 5) Path Forward

Detections Table
Indoor Air Quality Assessment - Modine Manufacturing Company
Sampling Conducted March 19th - 20th 2003

Field ID	Description	Analytical Method	Analyte	Result (ppbv)	Lab Q	Result/ Occupational Exp. Limit (%)	Occupational Exposure Limit, (ppbv)
MD-AS-01	Office wing	TO14	Methylene chloride	1.13		0.005	25,000
	conference	TO14-SIM	Tetrachloroethene	0.2		0.001	25,000
	room	TO14	Trichloroethene	14.6		0.029	50,000
MD-AS-02	Office wing	TO14	cis-1,2-Dichloroethene	0.88 J		0.000	200,000
	restroom	TO14	Methylene chloride	0.64 J		0.003	25,000
	sink area	TO14-SIM	Tetrachloroethene	0.517		0.002	25,000
		TO14	Trichloroethene	61.5		0.123	50,000
MD-AS-03	NE plant	TO14-SIM	Tetrachloroethene	0.578		0.002	25,000
	corner	TO14	Trichloroethene	46.7		0.093	50,000
MD-AS-04	Training room	TO14-SIM	Tetrachloroethene	0.443		0.002	25,000
	near chem.	TO14	Trichloroethene	56.5		0.113	50,000
	storage area	TO14-SIM	Vinyl chloride	0.009		0.001	1,000
MD-AS-05	Center of	TO14-SIM	Tetrachloroethene	0.602		0.002	25,000
	plant near	TO14	Trichloroethene	42.2		0.084	50,000
	welding bays	TO14-SIM	Vinyl chloride	0.015		0.002	1,000
MD-AS-06	S end of plant	TO14	cis-1,2-Dichloroethene	0.62 J		0.000	200,000
	in historical	TO14	Methylene chloride	0.81 J		0.003	25,000
	degreaser	TO14-SIM	Tetrachloroethene	0.528		0.002	25,000
	location	TO14	Trichloroethene	34.6		0.069	50,000
MD-AS-07	OUTSIDE	TO14-SIM	Tetrachloroethene	0.053		0.000	25,000
	SAMPLE	TO14-SIM	Trichloroethene	0.204		0.000	50,000
MD-AS-08	Duplicate of MD-AS-05	TO14-SIM	Tetrachloroethene	0.582		0.002	25,000
		TO14	Trichloroethene	42.7		0.085	50,000
		TO14-SIM	Vinyl chloride	0.015		0.002	1,000
MD-AS-B1	Blank	TO14-SIM	Trichloroethene	0.025		0.000	50,000

Notes:

J = The analyte was positively identified but the reported value is estimated.

Occupational Exposure Limit value is the lowest of the OSHA PEL, ACGIH TLV or NIOSH REL.

OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit

ACGIH TLV = American Council of Governmental Hygienists Threshold Exposure Limit

NIOSH REL = National Institute for Occupational Safety and Health Recommended Exposure Limits

TABLE
Calculation of Risk-Based Concentrations in Ambient (or Indoor) Air - Worker Exposure Scenario

EXPOSURE PARAMETERS	UNITS	VALUE
Target cancer risk	TR	1E-05
Target Hazard Quotient	THQ	1.0
Body weight, adult (kg)	BW	70
Air breathed (m3/d)	IRA	20
Exposure frequency (d/yr)	EF	250
Exposure duration (yr)	ED	25.0
Averaging time - carcinogenic (yr)	AT_C	70
Averaging time - noncarcinogenic (yr)	AT_N	25.0

Chemical			Screening Levels in Air (mg/m ³)			Screening Levels in Air (ug/m ³)			Final Screening Level in Air (ug/m ³)	Basis
			Inhalation Slope Factor (kg-day/mg)	Inhalation RfD (mg/kg-day)		Carcinogenic	Noncarcinogenic	Lowest Value		
trichloroethylene	2.00E-02	1.00E-02	7.2E-03	5.1E-02	7.2E-03	7.2E+00	5.1E+01	7.2E+00	7.2E+00	1E-05 ELCR
cis-1,2-dichloroethylene		1.00E-02		5.1E-02	5.1E-02		5.1E+01	5.1E+01	5.1E+01	HQ=1
vinyl chloride	1.54E-02	2.86E-02	9.3E-03	1.5E-01	9.3E-03	9.3E+00	1.5E+02	9.3E+00	9.3E+00	1E-05 ELCR

Modine

Air

Results

Field ID	Description	Analytical Method	Analyte	Result (ppbv)	Result (ug/m3)	Occupational EPA LC (ug/m3)	1.00E-04 HQ = 1
MD-AS-01	Office wing conference room	TO14	Methylene chloride	1.13	4	870	
		TO14-SIM	Tetrachloroethene	0.2	1	70	
		TO14	Trichloroethene	14.6	78	4 -- 72	
MD-AS-02	Office wing restroom sink area	TO14	cis-1,2-Dichloroethene	0.88 J	3	51 nc	
		TO14	Methylene chloride	0.64 J	2	870	
		TO14-SIM	Tetrachloroethene	0.517	4	70	
		TO14	Trichloroethene	61.5	330	4 -- 72	
MD-AS-03	NE plant corner	TO14-SIM	Tetrachloroethene	0.578	4	70	
		TO14	Trichloroethene	46.7	251	4 -- 72	
MD-AS-04	Training room near chem. storage area	TO14-SIM	Tetrachloroethene	0.443	3	70	
		TO14	Trichloroethene	56.5	145	4 -- 72	
		TO14-SIM	Vinyl chloride	0.009	0.05	238	
MD-AS-05	Center of plant near welding bays	TO14-SIM	Tetrachloroethene	0.602	4	70	
		TO14	Trichloroethene	42.2	227	4 -- 72	
		TO14-SIM	Vinyl chloride	0.015	0.04	238	
MD-AS-06	S end of plant in historical degreaser location	TO14	cis-1,2-Dichloroethene	0.62 J	2	51 nc	
		TO14	Methylene chloride	0.81 J	3	870	
		TO14-SIM	Tetrachloroethene	0.528	4	70	
		TO14	Trichloroethene	34.6	186	4 -- 72	
MD-AS-07	OUTSIDE SAMPLE	TO14-SIM	Tetrachloroethene	0.053	0.4	70	
		TO14-SIM	Trichloroethene	0.204	1	4 -- 72	
MD-AS-08	Duplicate of MD-AS-05	TO14-SIM	Tetrachloroethene	0.582	4	70	
		TO14	Trichloroethene	42.7	229	4 -- 72	
		TO14-SIM	Vinyl chloride	0.015	0.04	238	
MD-AS-B1	Blank	TO14-SIM	Trichloroethene	0.025	0.09	4 -- 72	

July 25, 2003 Madine / Sunstrand / EPA / MDNR Meeting

<u>Name</u>	<u>Company</u>	<u>Phone #</u>
Christine Kays-Mitchell	MDNR	314-416-2960 Ext 256
R Bruce Stuart	MDNR	573-751-1405
Richard Nussbaum	MDNR	(573) 751-3553
Tom Sanicola	Madine	(262) 636-1649
Don Price	CH2M HILL	(314) 421-0900
John Lowe	CH2M HILL	(937) 228-4285
John Hooker	JECOR / MS	217-698-7247
Scott Moyer	HAMILTON SUNSTRAND	(815) 226-6232
Robert Zimmer	MACTEC	(303) 293-6015
David Garrett	EPA	(913) 551-7159
Jeremy D Johnson	EPA	(913) 551-7510
Don Van Dyke	Mo. DNR Superfund	(573) 522-3351

modine meeting w/MDNR

7/24/03 1000 hrs

* NO sampling for 1,4-dioxane currently even though TCA contamination.

Modine vs. Sunstrand - GW

- has TCE indoor air exceedances of EPA levels, lower than OSHA
- no pure chlorinated solvents are used, they are water based now.
- OSHA has indoor air lead.
- see modine EI handout
- * Region VIII has met EI's because they met the OSHA levels. What is Region VIII's view on this? Sunstrand is a RCRA site in Region 8.
- * Do we want to conduct indoor air sampling in homes?
- MDNR does not think GW is contributing to indoor air due to GW depth (over 100 ft. deep).
- If GW data indicates that Sunstrand is the culprit then modine may qualify for a future YES on CA 750.
- * modine GW ^{info.} data → ^{indoor air}
- * Provide this ^{info.} plus raw analytical data to EPA EI contractor.

7/24/03

*Modine Manufacturing Presentation
to MDNR & EPA*

Evaluation of Environmental Indicator for Human Exposure Under Control

Camdenton Missouri Facility

Background

- **An indoor air quality assessment was requested by MDNR, in order to demonstrate that residual VOCs in soil at the facility achieved Environmental Indicators (Human Exposure Under Control)**
- **Use of the Johnson and Ettinger model (USEPA, 2000) was originally proposed to make the EI determination.**

Background

- **After further consultation and review, Modine decided that actual sampling of the indoor air would provide definitive numbers related to human exposure from this pathway.**
- **This decision to collect samples was further supported by an October 2, 2002 letter from MDNR which indicated that a corrective action Environmental Indicator (EI) evaluation had been completed by MDNR for the Camdenton facility.**

Background

- **The evaluation indicated that more information was needed to determine if unacceptable human exposure to contamination was occurring at the Camdenton facility in the form of indoor and outdoor air quality.**
- **In response, Work Plan Addendum 3 - Corrective Action Indoor Air Quality assessment was prepared and submitted to the MDNR in December, 2002.**

Background

- **The Work Plan specified sampling indoor air for residual COCs found in soil:**
 - Trichloroethene (TCE)
 - Cis-1,2-dichloroethene (cis-1,2-DCE)
 - Vinyl Chloride
- **Modine verbally proposed comparing data to 1% of the OSHA standard**
- **At the request of MDNR, the Work Plan presented risk-based screening levels based on a worker exposure scenario for data comparison.**

Background

- **Following review of the Work Plan, MDNR requested additional modifications in a letter dated February 28, 2003.**
- **Modine submitted a written response on March 3, 2003; and the following modifications were agreed upon verbally and documented in an email from MDNR on March 7, 2003:**
 - **Collection of an ambient outdoor air sample**
 - **Addition of five constituents to the analyte list (1,1-DCE, 1,1,1 - TCA, 1,1 - DCA, PCE, Methylene Chloride)**
 - **Comparison of results to both industrial and residential risk-based target concentrations.**

EI Considerations in Workplaces

- EPA's *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* was developed for use in residential settings and is not applicable for industrial facilities.
- The draft guidance provides no methodology or screening levels for evaluating potential vapor intrusion pathways in workplaces.

El Considerations in Workplaces

- **With regard to work places, the draft guidance states:**
 - *OSHA and EPA have agreed that OSHA generally will take the lead role in addressing occupational exposures. Since, workers will generally understand the workplace (e.g., OSHA) regulations (and monitoring, as needed) that already apply and provide for their protection.*
 - *In general, therefore, EPA does not expect this guidance be used for settings that are primarily occupational.*

Application of Guidance

- **Environmental indicators determination using the indoor air data should be based on comparison of results with occupational exposure standards:**
 - **OSHA 8-hr time-weighted average (TWA) Permissible Exposure Limits (PELs) using National Institute for Occupational Safety and Health (NIOSH) sampling methods**
- **Air sampling conducted as part of this assessment used an approach that resulted in detection limits that were much lower than standard NIOSH air sampling methods**
 - **an OSHA compliance evaluation of the facility using NIOSH sampling methods would probably not detect concentrations in air**

EPA Region VII and MDNR Guidance

- **EPA Region VII has not developed guidance with regard to the issue of indoor air and EI determinations in workplaces.**
- **The MDNR is in the process of developing the “Risk Based Groundwater Remediation Rule” which will address multiple media including indoor air.**
- **Currently MDNR has no guidance with regard to indoor air and EI determinations in workplaces.**

Guidance from Other Sources

- **Other EPA regions are incorporating the use of OSHA regulatory levels, or variations thereof, for EI determinations in workplaces.**
- **Guidance from EPA Region I and an example from EPA Region VIII are being provided as part of this presentation to assist EPA Region VII and MDNR with their decision regarding indoor air and EI determinations in workplaces.**

EPA Region I

- **Developed informal guidance (in April 2001) on Environmental Indicators determinations for vapor intrusion pathways in work places:**
 - *To determine if indoor air is an exposure pathway with unacceptable risk to human health under current industrial use (i.e., under current ownership which operates the facility with full, actively maintained knowledge that releases from current and past operations exist which may contribute to current indoor air concentrations) EPA Region 1 will use the lowest value available within OSHA regulations (i.e., Permissible Exposure Levels (PEL) and guidance (i.e., Recommended Exposure Levels set by the National Institute for Occupation Safety and Health and Threshold Limit Values set by the American Conference of Governmental Industrial Hygienists).*

EPA Region I

- **EPA Region I informal guidance**
 - *To account for the added response time which may be necessary to gain control of an environmental source of air contamination (e.g., solvent releases into shock adsorbent flooring, or sub-floor soils) EPA is cutting the OSHA standards and guidance by a factor of 100, thus using 1% of the OSHA levels as the screening level to determine achievement of environmental indicators.*
- **Concentrations in indoor air at the Camdenton facility fall below these 1% values.**

EPA Region VIII

- **At a RCRA site in Denver, a NIOSH sampling method was used to evaluate occupational exposure to 1,1-dichloroethene**
 - **Results were less than the reporting limits for the method**
- **Based on the results, the EPA Region VIII Project Manager concurred that the EI for Human Exposure Under Control was met at the facility.**

Sampling

- **A Pre-Sampling Assessment was conducted to determine appropriate sample locations.**
- **Locations were selected based on:**
 - Floor Breaches
 - HVAC System Service Areas
 - Prior Use
- **Six samples and one duplicate sample were collected from the interior, one sample from the exterior at the southeast corner of the fenced property, and one blank sample.**

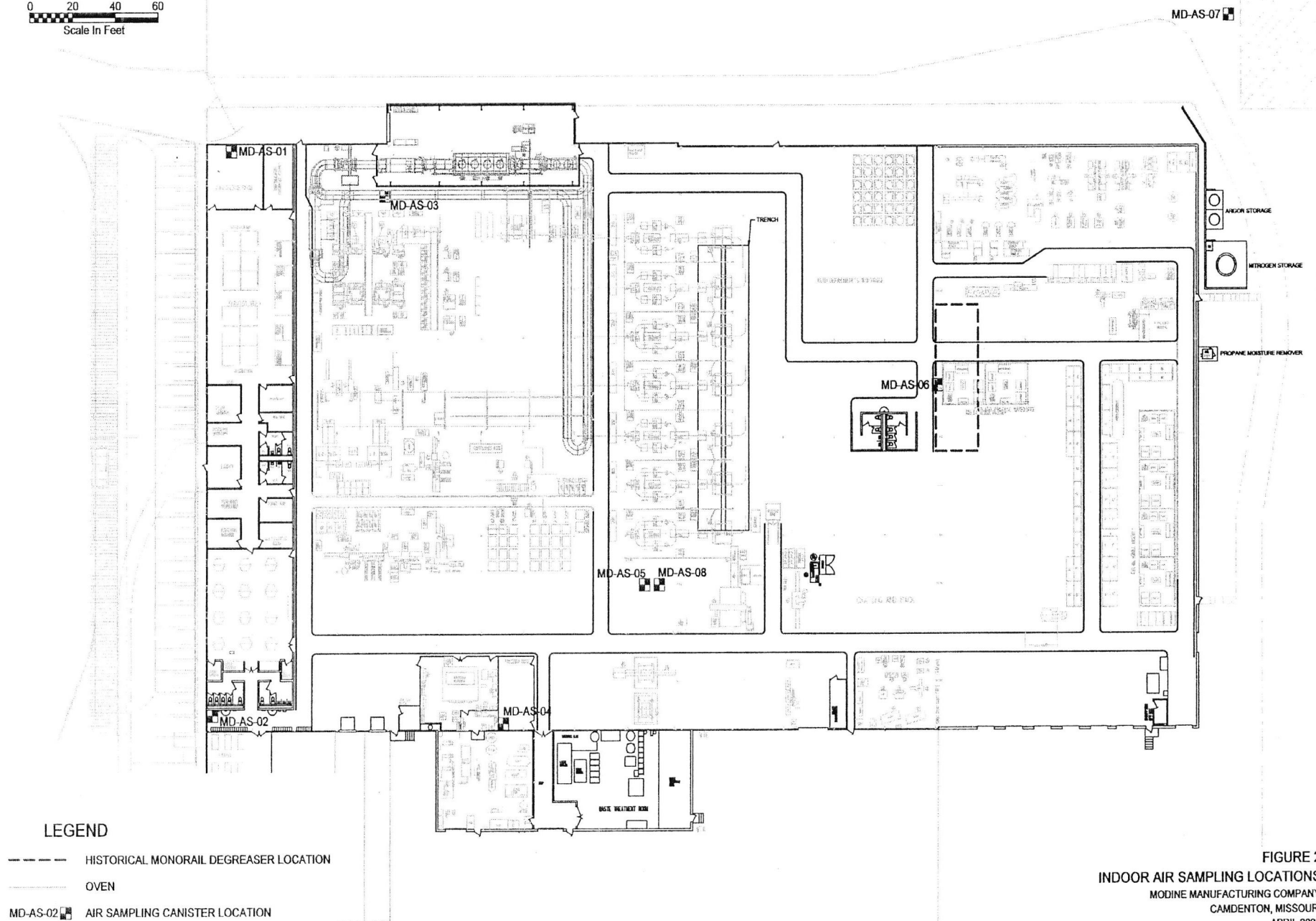
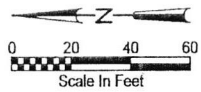


FIGURE 2
INDOOR AIR SAMPLING LOCATIONS
 MODINE MANUFACTURING COMPANY
 CAMDENTON, MISSOURI
 APRIL 2003

CH2MHILL

Summary of Air Sampling Results

- **Low concentrations of cis-1,2-DCE, methylene chloride, PCE, TCE and vinyl chloride have been detected in indoor air at the facility.**
- **Low concentrations of PCE and TCE were detected in the outdoor air sample located at the southeast corner of the fenced property.**
- **Results are presented in the following table.**

OSHA

NIOSH REL = National Institute for Occupational Safety and Health Recommended Exposure Limits

Background Concentrations

- **Sources of Background include:**
 - residual concentrations in a clean canister,
 - residual concentrations in the laboratory analytical system,
 - volatilization from building materials in the facility or adjacent structures,
 - releases to indoor air from materials brought into the facility by employees or vendors and purchased products that contain residual chlorinated VOCs,
 - releases to indoor and outdoor air from consumer products containing chlorinated VOCs,
 - releases to outdoor air from industrial, commercial, and institutional processes that use chlorinated VOCs, and
 - possibly volatilization from soil and/or groundwater.

Outdoor Air/Background Concentrations

- **In Denver, the maximum TCE concentration measured in outdoor air as part of the Urban Air Toxics Monitoring Program during 2001 was 0.2 ppbv.**
- **Several studies have shown background TCE concentrations measured in Denver homes ranging from 0.02 ppbv to 0.1 ppbv.**
- **New York State has reported TCE concentrations ranging from 0.04 ppbv to 0.2 ppbv in outdoor air samples.**
- **The 0.2 ppbv measured in outdoor air at Modine is consistent with ambient background.**

Conclusions

- **Concentrations of VOCs detected indoors in a workplace setting should be addressed as part of facility's occupational safety and health program regulated under OSHA, in accordance with EPA's draft vapor intrusion guidance.**
- **Concentrations in indoor air at the Camdenton facility fall below occupational exposure limits.**
- **The RCRA Environmental Indicator (EI) for Human Exposure Under Control has been met at the Camdenton Facility.**